

Accelerator Systems Division Highlights for the Two Weeks Ending July 25, 2003

ASD/LANL: Warm Linac

July 18, 2003

HIGH-POWER RF (WBS 1.4.1.1)

Accomplishments This Week: (1) We continued the heat run on 7th DTL klystron. Progress was delayed to repair a drive cable which failed inside the shielding. (2) The two LANL test stand transmitters were reconfigured to allow their independent simultaneous operation. Concerns & Actions: Our primary concern continues to be the performance and timely delivery of the Thales klystrons: (1) K. Young was at the Thales factory in France this week to resume acceptance tests on the 5-MW CCL klystrons. Results were unsatisfactory because of heating and arcing with the MEGA windows which contain the SF₆ in the waveguide transition. A new approach is being implemented using AFT circulator windows. Hopefully one tube will pass next week with equipment borrowed from LANL and ORNL. Subsequent tubes will be delayed while components are purchased from AFT. Impact (if any) on the Integrated Project Schedule must still be evaluated. (2) Thales 0.55-MW SCL klystron S/N 5 arrived at LANL for site acceptance tests. It was installed onto the LANL test stand. The failed first three klystrons are likely to be returned to the factory for repair.

HIGH-VOLTAGE POWER CONDITIONING (WBS 1.4.1.2)

Accomplishments: (1) The prototype high-voltage converter modulator (HVCN) system at LANL has been performing well. The production unit is ready for operation once transmitter interfaces are complete. We completed the hazard control plan for two-modulator operation, and updated PLC programming in SCR controllers to improve safety. The production unit capacitor bank has been fully charged. (2) Dynapower reported that they are on track for starting acceptance tests on the next two SCL HVCN units during the week of 7/28. LANL is grateful of ORNL for agreeing to witness these tests. The remaining four HVCNs are scheduled to be tested during the weeks of 8/18 (two units), and 9/8 (two units). LANL will provide support for witnessing these tests. (3) D. Anderson reported that HVCN systems are performing well at ORNL and installation has begun on the last DTL unit and the first CCL unit. DTL Tank-1 conditioning is underway with over 500-kW of forward RF power.

DRIFT-TUBE LINAC (WBS 1.4.2)

Accomplishments - Tank-1: The stainless steel version of the aluminum valve to tank end wall flange is being fabricated; completion is scheduled for next week.

Tank-4: Drift tube groups A, B, C, & D were internally machined. They are in the process of having the magnet installation features and tooling ball conical receptors machined into the bodies. Magnet installation is to begin on 7/22. Cap weld development is completed; water channel weld repair qualification is underway and should be completed by the end of next week. Current delivery schedule of tank 4 drift tube groups to ORNL: 4A - 9/15/03; 4B - 9/22/03; 4C - 9/29/03; 4D - 10/06/03. Waveguide is complete and leak checked. Additional leak checking and flow testing by is underway; projected shipping to ORNL is next week.

Tank-5: Drift tube group G water channel welds were completed. Waveguide is complete and leak checked. Additional testing is underway; projected shipping to ORNL is next week.

Tank-6: Diverter brazing for groups 6 H (11 units) is underway; group 6I (11 units) undergo diverter to body braze next week. Waveguide equatorial braze complete, leak checked and unit has been transported to CMI for further machining.

Tank-2: Drift tube welding and machining contract has been awarded to ESCO (Concord, CA). Machining work is underway. Forecast delivery dates to ORNL meet the Integrated Project Schedule: Group J - 9/18/03; Group K - 9/24/03; Group L - 9/30/03; Group M - 10/6/03. Diverter machining and brazing preparation work has been awarded to Bodycote (Fremont, CA). Waveguide equatorial braze complete, leak checked and unit has been transported to CMI for further machining.

Beam Position Monitor Drift Tubes: Internal parts for unit 9 are complete (Fig. 1) while parts for unit 10 are scheduled to be shipped today. Testing of the internal parts should be complete by 7/23. DT tube body parts are being machined. Diverter and stems are ready. Brazing is scheduled for completion 8/25.

Concerns & Actions:

EM Dipole Drift Tubes: The first batch of EMD magnets is due at ORNL today; our plans are to receive at LANL the first pair of mapped and tested magnets from ORNL on 7/22. There has been a problem with three of the magnets failing electrical "high pot" tests after rework machining; shorting by machining coolant is suspected.

Machining has been halted until the coolant problem is resolved but good magnets (4 machined units passed the high pot test) are still projected to be at LANL on 7/22. No schedule slippage is anticipated due to the three failed units as there are production spares available. One of the stem yokes assemblies warrants remanufacture; this will not affect the EMD DT delivery schedule but has had the effect of pushing the tank two diverter/stem modifications machining to other LANL shops and private vendors. The balance of the hardware is ready for magnet installation; welding is still scheduled to commence at Sciaky on 8/4.

Tank-4 Deliveries: We need to improve delivery schedule of the Tank-4 drift tubes. Also, there is concern of poor schedule performance of the beam box/slug tuner vendor. We are working with the vendor to ensure timely delivery; we have contacted an alternate vendor and obtained a schedule and bid from them in the event this action is required.



Fig. 1: DTL beam position monitor (BPM) unit no. 9 (of 10).

COUPLED CAVITY LINAC (WBS 1.4.4)

Accomplishments: (1) CCL module-1 assembly and tuning is ongoing at ACCEL. The ACCEL/LANL/ORNL team worked through setup and checkout of the bead-pull apparatus and data acquisition software (Fig. 2). Other parallel on-site activities include organization of a large data transmittal for QA activities (inspections and testing) completed to date on the manufacturing tasks. Also, brazing of the final two segments and post braze tuning of the last four segments in module-1 are being done to continue preparation for full module tuning later next week. (2) Casting samples were reviewed and production release has been authorized for the stainless steel CCL EMQ magnet support legs. We expect parts to arrive for final machining in about 3 weeks. (3) CCL support stand for module 2 arrived at ACCEL (Fig. 2) and the module 3 units are complete and ready for inspection and acceptance at General Tool. The vendor is on track with the schedule and will likely complete all stand work by the end of July. Units are shipped to ACCEL in pairs as they become ready. (4) The magnet/ intersegment assembly fixture was completed by CMI; plans are underway to begin assembly at LANL of intersegments as they become available. The assembly process includes installation of final magnet wiring for steering and thermal protects as well as water hose and cooling manifold installation for each magnet and integration of the beam tube/diagnostic package for each depending on the unit.

Concerns & Actions: Efforts were invested to improve schedule performance on the intersegment manufacturing contract. The vendor (ESCO) has realigned resources. We expect first shipment of CCL parts early August to support the Integrated Project Schedule.



Fig. 2: CCL module 1 tuning preparation at ACCEL. Module 2 support stands are in background.

July 25, 2003

HIGH-POWER RF (WBS 1.4.1.1)

Accomplishments This Week: (1) DTL klystron S/N 10 passed site acceptance tests at LANL. (2) We received test data from CPI for SCL klystrons S/Ns 26, 27 and 28. LANL is currently reviewing data for approval; tubes should ship from factory on 7/25. (3) We were at Titan to test SCL transmitter S/N 7. Results to date are satisfactory; we anticipate finishing on 7/28.

Concerns & Actions: Our primary concern continues to be the performance and timely delivery of the Thales klystrons. (1) J. Bradley is at Thales to review data for 5-MW CCL klystron S/N 3. To meet the project schedule, we have agreed to ship this tube to LANL even though the arc detector does not meet the leak specifications, the heat run was preformed with no arc detector, and the SF₆ waveguide window performance is unsatisfactory. Thales management agreed that the problems would be corrected on the next tube. (2) J. Bradley also witnessed the factory acceptance tests of Thales SCL klystron S/N 7; results to date are unsatisfactory.

HIGH-VOLTAGE POWER CONDITIONING (WBS 1.4.1.2)

Accomplishments: (1) The LANL production high-voltage converter modulator (HVCN) was operated at full 1.2-ms pulse width, 100 kV, and 30 Hz into a DTL klystron load. Results to date were satisfactory, although higher power operation was limited by SCR supply misfires. We reviewed the situation with Dynapower and are replacing the SCR assembly. (2) The prototype HVCN at LANL operated without failure in support of Thales SCL klystron testing and DTL klystron heat runs.

DRIFT-TUBE LINAC (WBS 1.4.2)

Accomplishments - Tank-1: ORNL reports that DTL Tank-1 is now operating with high-power RF at conditions exceeding the design accelerating field gradients, and at 30 Hz repetition rate and full pulse length (1/2 of the design duty cycle). The conditioning of the tank, although expected to be much more difficult than Tank-3 due to the different geometry went extremely smooth with excellent vacuum performance during ramp up. Congratulations to all on this significant accomplishment!

Tank-4: Drift tube Groups A, B, C & D have been internally machined and are ready for magnet installation. Magnet installation has been deferred pending resolution of the cracking issue of the cap end water channel weld (see *Concerns and Actions* Section). Cap weld development is completed; water channel weld repair qualification is complete. Quick prototypes to check the value of an intermediate stress relief and a new combined end cap/water channel weld are in progress; stress relief units are in the furnace and the bid is due 7/25 on the combined weld unit. Current delivery schedule of tank 4 drift tube groups to ORNL: 4A - 9/15/03; 4B - 9/22/03; 4C - 9/29/03; 4D - 10/06/03. The waveguide drive iris is complete and has been shipped to ORNL by ground transportation.

Tank-5: All water channel welds complete; cavity machining is underway on groups E & F. Group G water channel welds are in progress. The waveguide drive iris is complete and has been shipped to ORNL by ground transportation.

Tank-6: All water channel welds complete; cavity machining is underway on groups E & F. Group G water channel welds are in progress. The waveguide drive iris is complete and has been shipped to ORNL by ground transportation.

Tank-2: Machining work continues at ESCO (in Concord). LANL QA specialists at ESCO are reviewing documentation and procedures; more LANL personnel will be at ESCO next week to monitor machining operations. The diverter machining and brazing preparation work is underway at Bodycote (in Fremont). The waveguide drive iris exterior machining is underway at CMI; plating for vacuum ports scheduled for 8/7.

Beam Position Monitor Drift Tubes: Internal parts for all units are complete and tested. Six of ten coolant jackets are brazed; balance is in process. Diverters, stems and end caps are ready. Brazing is scheduled for completion 8/20.

EM Dipole Drift Tubes: Seven (of 24 required) good magnets are at LANL and are being prepared for loading into drift tubes; another ten are enroute from ORNL (six expected today) and today Milhous is shipping an additional four magnets to ORNL for mapping and flow testing. Drift tube cavity welding is still scheduled to commence at Sciaky on 8/4.

Beam Boxes: Negotiations continue with the vendor with resolution expected 7/25. Delivery dates are now the following (add a week for delivery date to Oak Ridge): Box 3/4 22 Aug.; Box 4/5 22 Sep.; Box 5/6 22 Sep.; Box 1/2 17 Oct.; Box 2/3 17 Oct.

Concerns & Actions: As reported last week we need to improve the delivery schedule of the Tank-4 drift tubes. We project a 6-week schedule slippage due to a number of causes including: (1) Accumulated delays such as welding machine downtime, personnel absences at vendors, delays in completing weld qualifications, etc. (2) Halt of work to determine cause of water channel weld leaks after diverter brazing; although these leaks occurred on only a few units it was deemed prudent to stop production until the leaks and their cause(s) were understood and rectified to ensure highest quality hardware to be shipped to ORNL. A change in procedures (diverter brazing is now done prior to water channel e-beam welding) to prevent this type of leak was developed along with a repair procedure for existing or potential leaks; these actions required time and production was slowed or stopped during this time. (3) The first water channel repair weld qualification tests showed pre-existing cracks at the root of the welds and although the weld repair has been modified to fully consume and eliminate these cracks and fabrication procedures changed to prevent the cracks, these changes have not been proven in a high fidelity test article. Such tests are underway. There is also a prototype drift tube incorporating a combined water channel and end cap weld being fabricated in the event the crack repair/prevention procedures to existing designs are not successful. ORNL and LANL are working closely together to minimize the schedule impact by trying to compress as much work as possible in preparing tanks into this additional six weeks. Details will depend on the exact path forward to be chosen, most likely known by the end of next week.

COUPLED CAVITY LINAC (WBS 1.4.4)

Accomplishments: (1) J. Billen, C. Deibele, and D. Richards were at ACCEL to continue tuning. They have started measuring tilt sensitivities in Module-1 segments. Startup problems with the bead pull hardware and software were resolved for the most part, and good results are coming from the latest bead pull measurements. (2) Additional RF analysis equipment was shipped from LANL to ACCEL and is being used presently in conjunction with software developed at ORNL for this equipment. (3) Initial difficulty with the tuning tool was resolved and segment/coupler end cell tuning at ACCEL is now being accomplished smoothly. (4) ACCEL completed brazing on all twelve Module-1 segments.

ASD/JLAB: Cold Linac

The M-3 cryomodule is cold and testing of tuners is well advanced.

Cryomodule M-4 has been completed and will be put in storage.

Attachment of end cans to the M-5 cryomodule has begun

Assembly of the M-6 cold mass is underway.

One cavity is qualified for the M-7 cryomodule.

ASD/BNL: Ring

Activities for the week ending July 18, 2003

Bids for the HEBT momentum collimator's Outer Shielding have been evaluated. Oak Ridge Tool-Engineering, Inc. was the successful bidder. A contract is being prepared.

Design room efforts continue on the HEBT quad and dipole installation/assembly drawings in support of ASD's installation efforts.

Drawings for the Ring primary collimator are complete and in checking.

A proposal was submitted to ASD on how to proceed with procurement plans for power supplies. The proposal addressed BA, operating margins for 1.0/1.3 GeV, and operational spares.

Engineers traveled to Ranor, Inc. (MA) to inspect and approve the Outer Shield Assemblies for the two HEBT collimators. These large fabrications were "accepted" and are being prepared for shipment to SNS/OR. Shipping arrangements have been made with D. Graves.

Two HEBT collimators are in route to SNS/OR. These two units were shipped from SDMS by sea in early July. ETA is July 25. Debra Graves has been notified.

A second shipment of five production magnets arrived in NY from BINP this past week. The magnets will be shipped to BNL after they clear US Customs.

The shipment of eight 21Q40 quads from Tesla to SNS/OR is scheduled for 8/8/03. We were advised this past week that the quad frames will not be ready on time and will be shipped separately in September.

High-pot failures occurred on two 21S26 magnets. Arrangements are being made to return these magnets to Alpha Magnetics.

Testing of the first article 30Q44 quadrupole is complete and the magnet has been approved as a production model. Magnetic measurements indicate that some shimming will be required.

Work continues to update and expand the magnet parameter spread sheets to include measured resistance, power requirements, PS matching, heat loads and water flow.

M. Hemmer is working with ASD on the naming system and convention for all BNL supplied hardware.

R. Lambiase is working with ASD to develop a polarity spreadsheet that will define magnet orientation and polarity for the lattice magnets.

Activities for the week ending July 25, 2003

Graeme Murdoch and Joe Error were at BNL this week. The purpose of their one-day visit was to review HEBT installation drawings, collimator assembly, mechanical systems status, magnet parameters, crane height and equipment handling.

Design room efforts continue on the HEBT quad, dipole and collimator installation/assembly drawings in support of ASD's installation efforts.

We are awaiting ASD guidance on how to proceed with our procurement plans for several medium range power supplies. The BNL proposal addresses BA, operating margins, and operational spares.

We are working with SDMS, our collimator vendor, for ways to reduce cost of the Ring primary collimator. SDMS is looking at various commercial and manufacturing aspects while BNL is looking at engineering options to reduce cost without sacrifice of quality or performance.

Outer Shield drawings for the Ring 2/3 collimators are being circulated for sign-off approval. A specification and SOW are being written. An RFQ will be issued by early August.

Two 21S26 magnets recently failed high-pot testing at BNL. One magnet has been repaired in-house while the second is being returned Alpha Magnetics.

BINP – a second shipment of five (5) quads arrived at BNL. Two more shipments (5 magnets each) are in route from Budker.

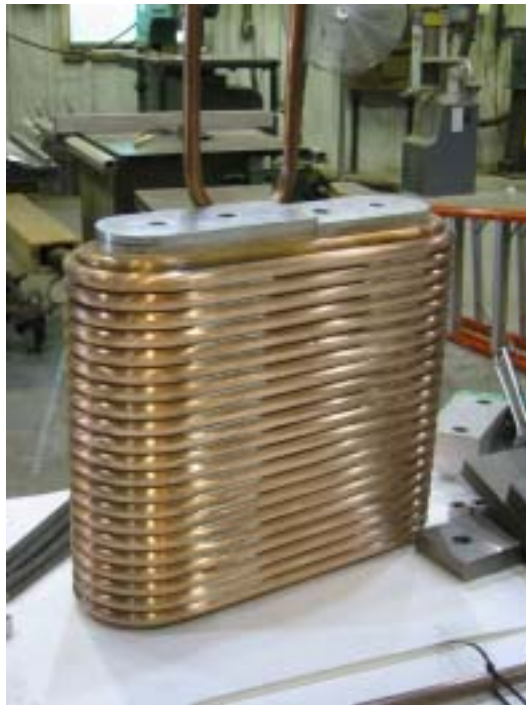
Preparations are being made at BNL to ship two (2) base plates to SNS/OR for the HEBT collimators.

Mag measure continues on 26Q40, 30Q44, 30Q58 and 21S26.

Half-cells #11 and #12 are assembled.

Work continues to update and expand the magnet parameter spread sheets to include measured resistance, power requirements, PS matching, heat loads and water flow.

A magnet connection spread sheet, based on required polarities and magnet orientation, is being generated.



36CDR30 Coil A



36CDR30 Coil C

Controls

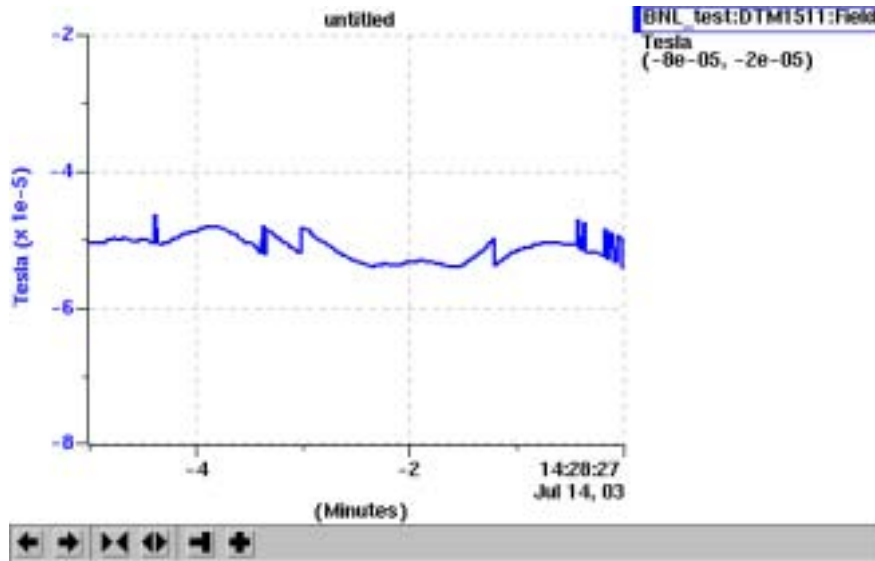
The Controls Group was very busy this week supporting the startup of DTL1 conditioning, and the restart of Front End operations. The timing system was modified to allow the Front End and DTL1 to operate at independent repetition rates. Modifications were required to the RCCS and LLRF systems. Completed test plans were signed for the DTL1 vacuum and thermocouple systems.

Considerable effort (2-3 man-weeks) was expended implementing an access security plan as requested by Operations. This will enforce the policy that remote control (remote from the control room) can only be achieved by requesting access for a specific task from the chief operator.

Planning continued on how to deal with expected budgetary shortfalls during the next fiscal year. This effort will stand us in good stead when FY04 work packages are being prepared.

The SNS Ring includes a reference dipole in series with the main bending magnets. The reference dipole will have a Hall Probe installed in it to measure the magnetic field. This week EPICS software was developed at BNL to interface the Hall Probe with a Group 3 DTM151 Digital Teslameter via an HP2050 Ethernet/GPIB bridge.

Below is a screenshot of the EPICS StripTool monitoring the Hall probe:



At LANL, a second Low-Level RF board was brought into operation and successfully tested. The LANL team agreed on how to restructure user documents to better organize different system issues and associated physical devices. Work continued on assessing the impact of upcoming (FY04) changes in burden rates at LANL.

The Personnel Protection System (PPS) Phase 0.4 system was officially signed off as operational and has been in use this week for RF conditioning of DTL1. Phase 0.4 documentation has been issued to the DCC. Some of this documentation fulfills action items for the ARR. The EPICS archiver has been updated to include additional tags that were added for the Phase 0.4 PPS.

UPS power has been pulled to all of the remote PLC I/O racks in the klystron gallery. ControlNet cables will be connected and power turned on next week.

A conduit that penetrates the north wall of the LINAC and runs approximately two feet underground to the ground level Emergency exit door has been cleared of dirt and debris by CF. It will be used to carry PPS and ODH wiring from the ground level Emergency exit door to the remote PLC racks in the klystron gallery.

A Labview-based test facility was created to calibrating and testing BLM AFE modules as they are produced. The system will be used at BNL by the Diagnostics group, and then shipped to ORNL.

A strategy meeting was held with Operations to discuss details regarding PPS hardware, sweep philosophies, and control of critical devices for the HEBT, Ring and RTBT.

The PPS ControlNet cabling for the Linac PLC network has been installed and tested.

Drawings and plans have been completed to install the proximity card reader that will be installed on the PPS entry station and used in the phase 0.4 PPS.

The "Approval of Unlisted Equipment" forms have been revised and reissued to the DCC

Thirteen members of the Controls group have completed training and signed a JHA authorizing testing and verification of unexposed (finger safe), energized 120 VAC circuits.

A system block diagram for ring vacuum controls was drafted and issued for review.

Installation

Craft Snapshot 7/23/03

ASD craft workers	73.0
Foremen, ES&H, etc	12.0
Less WBS 1.9 etc	8.0
Less absent	2.0
TOTAL	75.0

The C-1 Ring Half Cell was placed in final position in the ring tunnel. This represents the Start of Ring Installation and the completion of EP Milestone 2-12.

The 2K Cold Box to be installed in the CHL will arrive at the SNS site on July 28, 2003.

Repair of the HEBT Dipole Stand locations was started.

High Beta Wave Guide installation continued into Run #6.

Cable trays and hanger installation is 20% complete in the Ring Service Building.

ASD needs an updated Magnet Spread Sheet for BNL. Magnet voltage drops and heat loads are expected to be higher than previously anticipated.

Accelerator Physics

Applications group members were busy with DTL1 commissioning and Front-end startup. Beam was generated in the front-end, but work was hampered by difficulties with BPM diagnostics. Tank 1 was conditioned up to about 670 kW with 100 kW reflected power. This is about 30% higher field than required in tank 1, and is greater than the power required for 38 mA unchopped beam.

A number of ring beam dynamics studies are in progress. The first study explores the ring losses as a function of ring closed-orbit correction and BPM errors. A second study continues exploration of ring operation at 1 MW without the energy corrector and spreader cavities. J. Holmes finds that 1 MW accumulation in 730 turns gives less than 0.1% ring losses. Target profile is under study. In a third study, the full ring injection chicane has been added to the simulation. Beam distributions are somewhat broader and losses somewhat larger, but by small amounts.

The applications programming group has been working on benchmarking the online model with trace-3D. Good agreement is obtained now for trajectories and envelopes, but the longitudinal parameters are not in perfect agreement yet. Further refinement of applications is underway in preparation for DTL1 commissioning.

Operations Group

Two logbooks are now in place to track maintenance. The Maintenance logbook is to be used for Preventative Maintenance requests and logging completed PM Tasks. The Fault Report Logbook is to be used to log system faults which need corrective action. System owners should log the corrective action and close out the fault report.

The new ASD Action Tracking system is up and running. Determined the rules for submission and sign off

We have completed DTL Tank 1 Processing.

Front End Startup was suspended due to inoperable BPMs.

We are proceeding with Leak checking DTL Tank and DTL Tank 3 window replacement.

We will then proceed to D-Plate installation which is expected to take 6 days.

We will also do PM and Corrective Actions during this period. Corrective Action and PM must be logged in the appropriate logbook.

We will lay on a shift schedule for the area managers to use second and third shift running as desired.

Group Leaders were reminded that Test Plans must be completely signed off by August 4.

In view of the new, late delivery schedule of the Drift Tubes for DTL Tanks 4, 5, 6, we are re-evaluating the commissioning sequence.

Ion Source Group

After being run at the full 6% duty cycle for a total of about 13 hours, delivering roughly 30 mA with roughly 35 kW RF, the spare ion source has been removed from the hot spare stand. It was equipped with a new antenna and installed on the front end. There it delivered about 10 mA without cesiation. Currently it is being cesiated.

The front end ion source was removed from the front end and equipped with the antenna removed from the spare ion source. After being installed on the hot spare stand it delivered about 10 mA before being cesiated. After one cesiation cycle, the current increased to 28 mA with about 30 kW. This demonstrates the interchangeability of the two ion sources.

PPS has been formally notified of the new RF safety chain which will be implemented once an electrician can be scheduled to reroute the 480 VAC through the LBNL contactor. The new RF safety chain significantly improves the safety of our ion source operations and enables improved stability of the ion source performance.

Safety and fire protection have been notified of the proposed change in the routing of the Hydrogen gas. Jim Eckroth, our fire protection engineer, agreed to verify that the new installation complies with all applicable codes. The new installation will significantly enhance many safety aspects of our ion source operations and save about 20-30 k\$ over the next 20 years.

The ion source group has increased by 9 lbs 5 oz. On July 23, 2003, Amy Welton gave birth to a 21" tall baby boy. Mom is doing fine and Dad Robert is adjusting.

After consulting with QEI we disabled the pulse width fault on the 2 MHz amplifiers. While a pulse width fault still changes the indicator light to red, it no longer switches off the high voltage and ceases operation until the fault is reset. This modification has enabled long periods of trip free ion source operation.

Paul Gibson has installed capacitive filters on the cables connecting ion gauge 1, 2, 3, and 5 with FEE 20. We hope this will resolve the lockup problems encountered with FEE 20.

Survey and Alignment

Aligned the first four HEBT Quads.

Verified the alignment and setout position of the first half cell.

Continued with the layout of all ring magnet centers.

Provided elevation marks along transfer lines at bayonets.

In cooperation with level-three engineers, a forward looking schedule was developed for Survey and Alignment with the Target Group. This schedule is based upon both the Target group's present schedule and the general contractor's current schedule.

Continuing with the update of survey data and X-Ref drawing base. This included incorporating the new warm section information into our master X-Ref.

Mechanical Group

HEBT & RING

75% of 12Q45's mounted on stands

HEBT Dipoles removed, stands removed, grout removed and cleaned ready for transition plates next week

First ½ cell in place in Ring tunnel.

Klystron Gallery – SCL Waveguide - First of 6 runs 50% complete.

Realignment of the HEBT Dipole magnets stands was completed.

Alignment of the installed 12Q45 magnets continues.

Received an additional 3 – 12Q45 magnet chambers.

Installation of the 21Q40 magnet stands was completed.

Received a shipment containing 75% of the HEBT collimators' shielding.

Cable pulling in the HEBT continues.

Cable tray installation in the RING continues.

Cable tray installation in the RING Service Building continues.

Buss installation in the RING continues.

Water Systems

Magnet Cooling Loads and Magnet PS Cooling Loads under going revision by BNL.

Magnet Installation drawing for the HEBT tunnel is approx 70% complete.

Working on details for bus bar cooling in the ring tunnel.

Sketches have been made for adding TWS&R to the PFN area for cooling the PFN's.

Starting B/M's for advance procurement of piping supplies for Ring Systems installation.

Prepared and coordinating a water systems task list for the assembly of a CCL module.

Still working with CF on the chilled water cleanliness. Found more gunk/metallic waste on the strainer magnet along with a brownish slim on the 100 mesh screen. Also, had CF work on getting the chilled water temperature brought back to the 45 F supply temperature. CF has started testing the CUB chillers and may have one at least partially loading next week.

Tower water system is still not ready for operation and can not get a guaranteed promise date.

Working on finding a possible closed loop system to allow magnet testing w/o TWS&R being available.

The apparent installation slowdown on CCL 3 has been accounted for. Hours worked on other piping installation tasks and attributed to CCL 3 were a contributing factor. Progress in all areas this week has been very good.

The manifolds for DTL-4 have been installed on the tank support frame. Installation of the hoses to begin next week. The work was done using craft personnel.

Continued installation of the DI water lines from the Conventional Facilities headers to the TRCC skid on CCL 3.

Continued installation of the piping on SCL_ME1.

Two pipefitters from SCL_ME1 will be working on the tunnel buss system during the upcoming week. As a result, personnel have been shifted from CCL to SCL in order to continue this work uninterrupted.

Magnet Task

Installing more beam pipes in 12Q45's.

We are also assembling our 21Q40 measurement stand.

We spent the week mapping DTL EMD's

Electrical Group

DTL-ME1 was operated successfully with a 2 klystron load configuration without incident for the DTL1 conditioning phase at ~105 kV, 1 ms pulse, 30 Hz. EPICS software was updated to reflect PanelView displays.

DTL-ME2 had its safety system upgrades, including solenoid valve shutoff of the SCR water and emergency off 13.8 kV automatic disconnect. Operation of this modulator is scheduled for late next week to support conditioning efforts with the new window in DTL3. We are investigating the possibility of extended runs for this unit as well.

Installation was completed this week on DTL-ME3. After some clean-up work next week, checkout is expected to commence.

The HVCM in the RFTF was modified slightly to accommodate additional cooling, and significant diagnostics were added. Once machined parts become available (August 1), we expect to begin operating this unit to support long-term, high average power studies, initially operating into a single beamstick. This unit will also provide for a test bed for additional R&D efforts.

The last 140 kV modulator and the first SCL modulator arrived this week. Personnel started preparing the SCL-ME1 unit for installation. Substantial work was also done preparing the CCL-ME1 unit for installation.

A calibration procedure was developed for the high voltage divider unit installed in the HVCM, as experience indicates calibration at the vendor results in voltage measurement errors.

ORNL personnel will be supporting acceptance testing of two more 80 kV HVCM units next week at Dynapower. Dynapower continues to be on schedule, and final unit delivery is scheduled for mid-September.

Checkout of the MEBT chopper system was completed. There is some concern about a long "tail" at the end of the pulse, which could result in unwanted beam steering. We are considering our options.

HPRF

An asphalt path was laid between the RF Test Facility and the Klystron Gallery that will allow us to use a boom-fitted fork-lift to move 550 kW klystrons/magnet assemblies between the buildings.

The monorail crane in the RFTF was upgraded to perform smoothly at slow speeds for better control when aligning klystrons in magnets.

The DTL2 Transmitter was calibrated for klystron power output to within 3.5%.

The first two SCL HV tanks and six 550kW klystrons were installed in the klystron gallery.

The RFQ RF Station klystron power output was recalibrated to verify accuracy to +/- 1%.

LLRF

Operations

Our primary operations activity this week has been to actively support the RF conditioning of DTL1. The Direct Digital Synthesis (DDS) feature of the LLRF control system has been used successfully for conditioning the tank at its resonant frequency, which is about 20 to 30 kHz below 402.5 MHz. A secondary activity has been support for turn on of the FE systems: the RFQ and MEBT rebunchers.

RFQ Test of Prototype FCM

The prototype Field Control Module (FCM) was tested successfully (see Fig. 1) on the RFQ this week (no beam). Open and closed-loop control of the RFQ fields at incident power levels >600 kW was demonstrated. The FCM and HPM interaction was demonstrated, i.e., HPM faults result in the FCM shutting down the RF drive to the klystron. We plan to conduct another test with beam as the schedule permits (we hope next week).

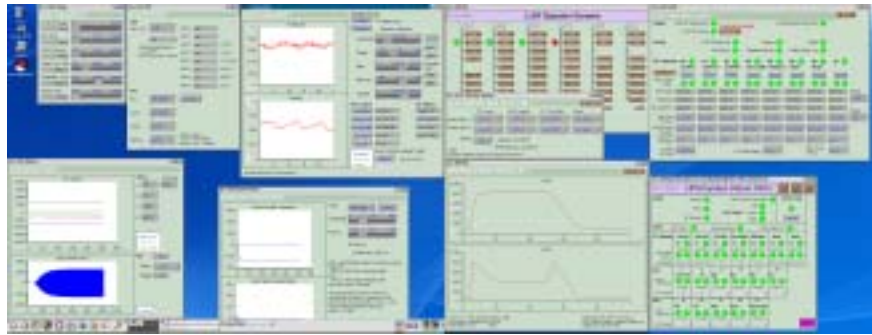


Figure 1. Screen shot taken during testing of prototype FCM with RFQ. Operating conditions are 15 Hz, 50 us, 640 kW. The regulation achieved is illustrated in the "FCM Control" window, which shows 25 us of data.

New Hardware Development

The Rev. B design packages for the Digital Front End (DFE) and VXI carrier board were released for review this week. The RF Output (RFO) package will be released next week. Once the team has signed off on all of the revisions, another prototype production run will commence.

LBNL

We are continuing to build the 2nd generation control chassis that are needed to control the remainder of the DTL tanks. Although these systems are due on Sep 1, we are advancing the production both to cope with some planned vacation and to allow for plenty of time to test. I expect three of them to be ready for firmware test at the beginning of August.

We are waiting for a set of the new boards (Field Control Module), under test at LANL, to continue supporting the development of the new system.

Larry has made significant progress on the firmware. Several changes and improvements have been completed and entered in the CVS repository. These changes include the firmware to do on the fly averaging of the history buffer, a 16 bit operation that much exceeds the current capability of decimation of the memory traces. The firmware allows setting from pulse to pulse a window and a span, much like a digital storage scope. This is now fully tested

and running on the Berkeley system. The only feature missing from the 'digital scope' equivalent is a way to visualize in EPICS the location of the window of monitoring within the pulse. Kay has apparently done this in the past and will try to add this feature at a later time.

In addition, Larry has completed a new version of the Verilog to improve the phase zero algorithm, now functional on two channels instead of only one. This is needed to find the zero phase setting when in self start mode.

We have also received and installed a new host computer (IOC, Linux of course) to support system development. This increases our capacity to support multiple systems development or testing and our capability to continue to operate while maintenance is performed on one of the systems.

Tamara Blain has joined the group as of July 1. She has been accepted in the UC Berkeley graduate program in Engineering and will work the rest of the summer to learn and support Larry's firmware efforts.

Cryo Systems Group

CHL: The LN2 distribution line along the outside of the facility has been commissioned.
The charcoal bed continues to be heated and vacuum pumped.
Alignment of the warm compressor motor couplings is continuing.
The contractor for the installation of the purifier piping is pressure testing the installation.

Tunnel: The warm gas piping installation continues.
The orbital welder has been repaired and installation of the helium purge tubing continues.
The helium supply and return transfer lines have been leveled with respect to the beam.

RATS: Work continues on the assembly of subassemblies for the transfer line "U" tubes

Beam Diagnostics